

# Bilingualism as One of Many Environmental Variables that Affect Language Development

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There are two overarching reasons for studying language development in children who live in bilingual environments. One is that environmental bilingualism is a fact of life for many children, with consequences that are less than fully understood. Because environmental bilingualism covaries with many other variables that influence language development, it is difficult to isolate the effect of bilingualism. In some cases exposure to multiple languages results in children achieving native-like competence in two (or more) languages, but in many cases it does not. We do not yet have good information on average effects of bilingualism on the development of each language nor good information on why some children are more successful at bilingual development than others.

A second reason to study language development in children who live in bilingual environments is that exposure to two languages provides a test of the human language acquisition capacity. It is of scientific interest to ask, “Can the brain acquire two languages as easily as one, or if not, how does bilingualism affect the course of development in each language?” The goals of the present study were to address these questions by (1) comparing the development of English in very young children who are acquiring English in bilingual and monolingual environments and (2) investigating factors that account for individual differences in the rate of English acquisition among the children in bilingual environments.

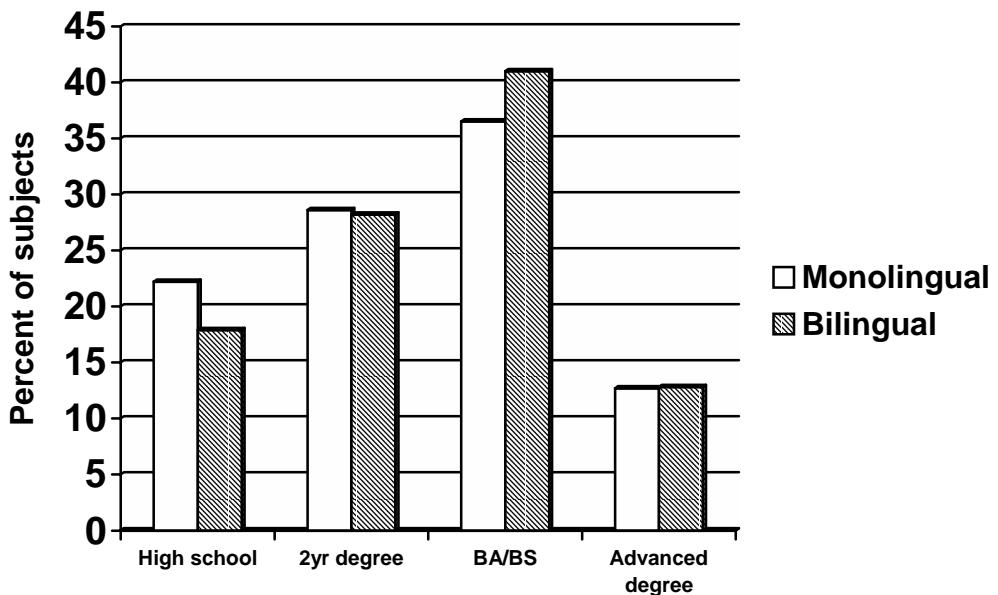
## 1. Method

### *1.1 Participants*

The children that were the focus of the study were 39 children acquiring English in bilingual homes and 63 children acquiring English in monolingual homes. They ranged in age from 16 to 30 months. A bilingual home was defined as any home with at least one resident who speaks a language other than English. These samples were selected from a larger on-going study. The bilingual home group included all the participants in bilingual environments from whom data had been collected; the monolingual home group was selected to be equivalent to the children in the bilingual home group in age, gender composition, and parental education levels. The distribution of participants across levels of maternal education is depicted in Figure 1.

All participants were healthy, full term children born in the United States. In the bilingual home group there were 25 boys and 14 girls, mean age = 22.8 (SD = 4.04). In the monolingual home group there were 38 boys and 25 girls, mean age = 22.8 (SD = 3.46). In 16 of the bilingual homes, the language other than English was Spanish; other second languages included Portugese, Creole, Hebrew, French, and others—all in small numbers.

Figure 1. Distribution of levels of maternal education for monolingual and bilingual homes



### 1.2 Procedure

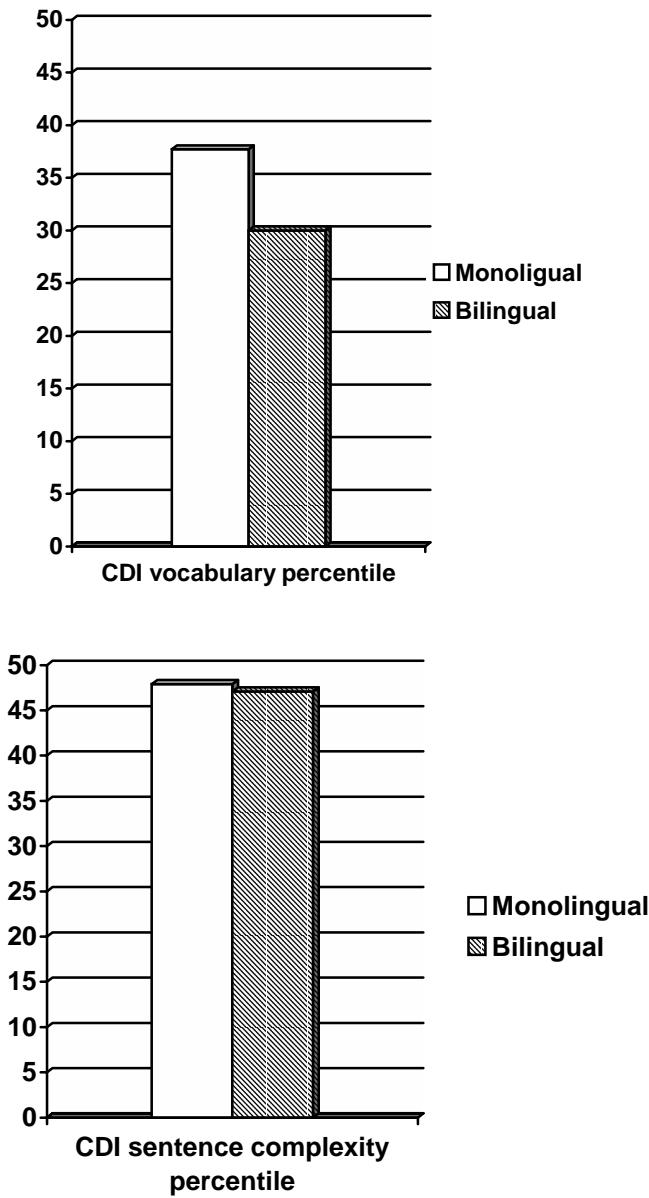
The children’s primary caregivers provided information on their vocabulary and grammatical development in English using the MacArthur Communicative Development Inventory: Words and Sentences (CDI). The caregivers of the children in the bilingual home group who were exposed to Spanish also filled out the Spanish-language version of the CDI, the *Inventario del Desarrollo de Habilidades Comunicativas*. In addition, all caregivers provided information on family demographic characteristics and on the home language environment via a 100-item structured interview. A trained undergraduate research assistant interviewed each caregiver. From the English CDI, two measures were calculated for each child: the percentile score for productive vocabulary and the percentile score for sentence complexity. For the children exposed to Spanish, the comparable scores were calculated from the Spanish instrument. The demographic measures used in the present study were maternal and paternal education and occupation. The measure of home language environment was the percent of time the children were exposed to a language other than English.

## 2. Results

### 2.1 Levels of English achievement by children in monolingual and bilingual environments

The mean percentiles attained by each group on the English CDI productive vocabulary and sentence complexity scales are presented in Figure 2. For vocabulary, the mean percentiles of both the monolingual home and bilingual home groups were below 50, and the monolingual group outperformed the bilingual group by 8 percentile points. This difference was marginally significant using a 1-tailed test,  $t(100) = 1.41, p = .08$ . In grammatical development, both groups performed very close to the 50<sup>th</sup> percentile and were virtually identical.

Figure 2. Levels of English achievement by children in monolingual and bilingual homes



The distribution of children in the monolingual and bilingual groups on vocabulary and grammar are presented in Figures 3 and 4. For vocabulary, children in both groups clustered at the lower end of the distribution, but this was more true of the children in the bilingual home group than for the children in the monolingual home group. For sentence complexity, children in both groups were represented throughout the distribution.

Figure 3. Distribution of English vocabulary percentile (CDI) scores for children in monolingual and bilingual homes

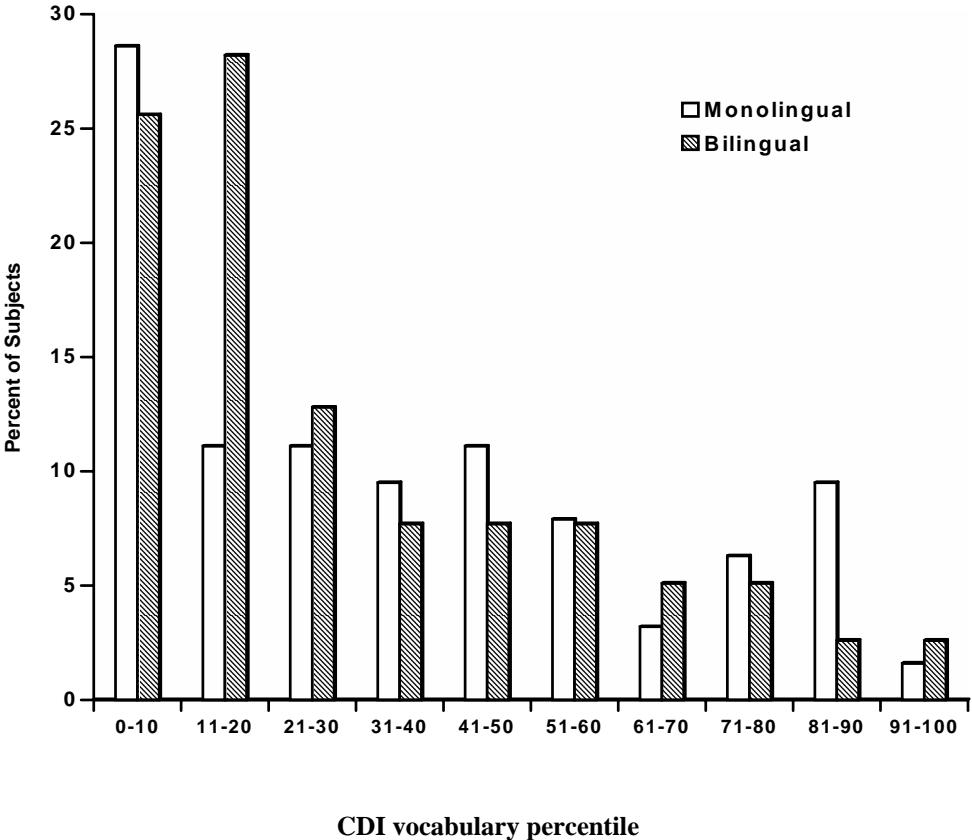
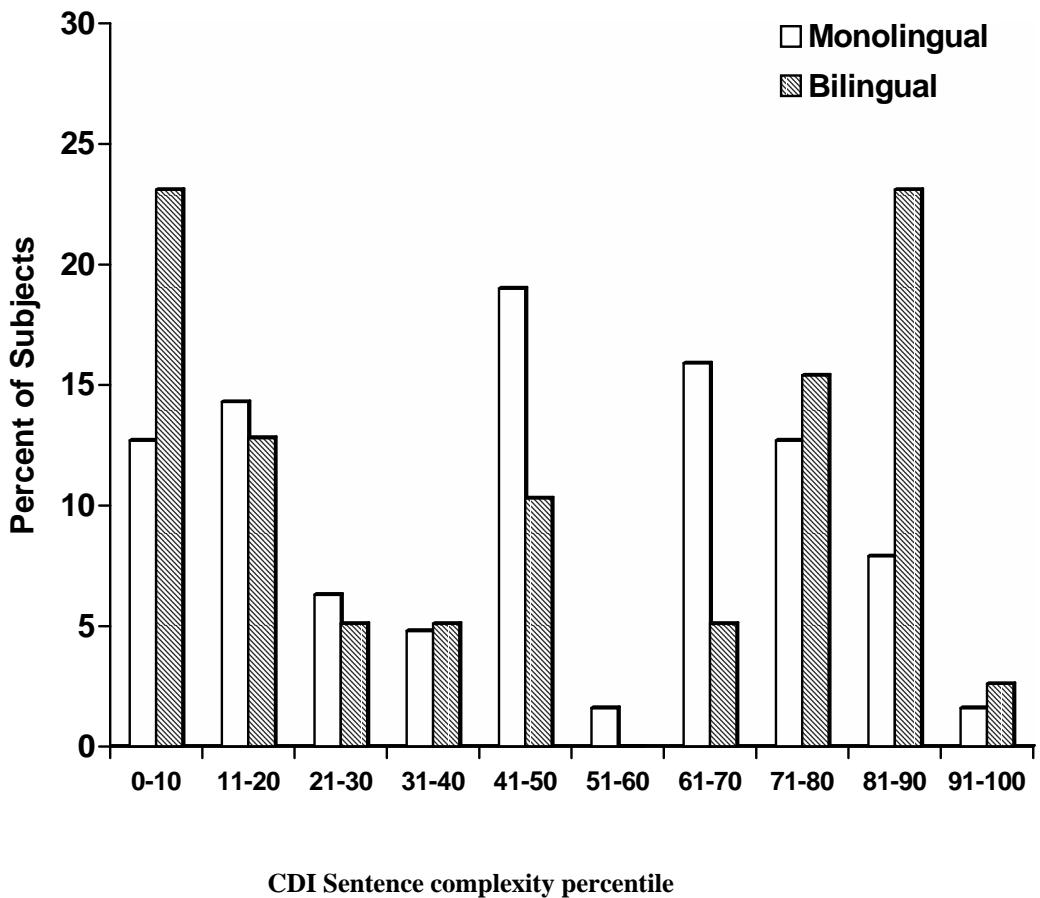


Figure 4. Distribution of English sentence complexity scores (CDI) for children in monolingual and bilingual homes



## 2.2 Predictors of English achievement among children in bilingual environments

The next analyses sought to explain the substantial individual differences in English achievement among the children in bilingual homes. Correlations of the English vocabulary and sentence complexity measures with the demographic and home environment predictors are presented in Table 1. Maternal education and occupation, but not paternal education or occupation, were significantly and positively related to children’s vocabulary and sentence complexity scores. The percent of time children were exposed to a language other than English was a significant negative predictor of English achievement. Maternal education and percent exposure to another language were unrelated ( $r(38) = -.19, p > .12$  (1-tailed)).

The last analyses asked whether, for the children in bilingual homes, there was a tradeoff between level of achievement in the two languages. This analyses could be conducted only for the children whose other language was Spanish. The correlations between measures of English and Spanish proficiency are presented in Table 2. There was a marginally significant, positive relation between children’s levels of achievement in sentence complexity in the two languages; there was no relation between vocabulary achievement in the two languages.

Table 1. Predictors of English achievement among children in bilingual homes

Predictor	English achievement measure	
	CDI vocabulary percentile	CDI sentence complexity percentile
Maternal education	.29*	.32*
Maternal occupation	.29*	.48**
Paternal education	.08	-.02
Paternal occupation	.15	.08
Percent exposure to another language	-.42**	-.32*

\*  $p < .05$  (1-tailed)

Table 2. Relations of Spanish to English proficiency measures among children in Spanish-English bilingual homes (n=16)

Spanish	English	
	CDI vocabulary percentile	CDI sentence complexity percentile
CDI vocabulary percentile	-.17	.27
CDI sentence complexity percentile	-.19	.36*

### 3. Discussion

The present study provided descriptive data on the early vocabulary and grammatical development of children acquiring English in monolingual and bilingual environments. Children in monolingual homes were (marginally) more advanced in English vocabulary development than children in bilingual homes; the groups did not differ in grammatical development. Both samples averaged below the 50<sup>th</sup> percentile in vocabulary and were at the 50<sup>th</sup> percentile in grammatical development. The below-norm performance of both groups on vocabulary development likely reflects differences between the present samples and the CDI norming sample. Other studies of have found that the CDI norms are most appropriate for mid- to high-SES samples (Arriga, Fenson, Cronan, & Pethick, 1998; Feldman, Dollaghan, Campbell, Kurs-Lasky, Janosky, & Paradise, 2000). This SES effect appeared for vocabulary, not sentence complexity. Perhaps relatedly, the effect of bilingualism was on vocabulary, not sentence complexity. The similar patterns in the SES and bilingualism effects suggest that vocabulary development is more sensitive to environmental effects than is grammatical development.

The present study also provided information on sources of variance in the English language development of the children in bilingual homes. Maternal education and occupation were strong positive predictors of individual differences among the children in English proficiency, and the percent of the children's language experience that was not in English was a negative predictor. The observed effect of maternal education is consistent with a large body of evidence on the relation of SES (often operationalized as maternal education) and language development in monolingual children (Hoff, 2003; Hoff, in press). The effect of amount of exposure to another language is consistent with previous findings regarding vocabulary development in bilingual children (Pearson, Fernandez, Lewedeg, & Oller 1997), and it is consistent with findings that amount of input predicts vocabulary development in monolingual children as well (Hoff & Naiges, 2002; Huttenlocher, Haight, Bryk, Seltzer, & Lyons

1991). The finding of no tradeoff between English and Spanish vocabulary development suggests, however, that time is not the limiting factor in these children's language development. The finding that, among the bilingual children, their grammatical complexity scores in English and Spanish were positively related suggests the work of some ability or experience common to the two languages.

#### 4. Summary and conclusions

The goal of this research was to describe the effects of environmental bilingualism on language development and to ask what those effects suggest about the human language acquisition capacity. The findings suggested that exposure to two languages causes children to acquire the vocabulary of each language at a slight slower rate than monolingual children acquire a single vocabulary. Effects of bilingual exposure on grammatical development were not detectable using this instrument at this point in development.

The findings also made clear that bilingualism does not prevent high levels of English achievement—even in the affected domain of vocabulary. Some bilingual children achieve high levels of proficiency and others do not. The factors that account for this variance are the same factors that account for variance in monolingual development—maternal education and amount of input.

A final implication of the present study concerns the significance of bilingualism as a factor in language development and how bilingual children should be assessed. In the present sample, environmental bilingualism accounted for 2% of the variance in children's vocabulary scores. This is equivalent to the effect size for gender and less than the effect of SES (Fenson, Dale, Reznick, Bates, Thal, & Pethick, 1994; Hoff, in press). On the one hand, this effect size suggests that bilingualism should be regarded as just one of a host of environmental factors that influences children's language development—and not one of the more significant influences. On the other hand, the effect size is large enough to suggest that when vocabulary development is used as an indicator of cognitive functioning, norms derived from a monolingual sample should not be applied to bilingual children. Separate norms are used for boys and girls, where the effect of gender is no greater.

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